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Histological and histochemical study of ductus deferens in *Aseel* and *Vanaraja* breeds of poultry

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Abstract

Aseel is an indigenous breed of poultry recognized for its majestic gait and cock fighting. Southern part of Chhattisgarh is its breeding tract. Vanaraja is a crossbreed being popularized by the Department of Animal Husbandary (C.G.) to improve the livelihood of tribal peoples. Ductus deferens is part of reproductive system which plays an important role in transportation of spermatozoa and fertilization. In the present study, 10 birds of two age group *viz.* 5 months (grower) and 13 months (adult) of each breed were used. Ductus deferens was collected, processed and sections were stained for demonstration of normal histological structure, collagen fibers, elastic fibers, reticular fibers, carbohydrates and mucopolysaccharides. The height of epithelium, height of mucosal folds at different segments, number of mucosal folds per transverse section, thickness of wall excluding mucosal folds, maximum and minimum diameter of ductus deferens was significantly higher in growers and adults of Vanaraja than Aseel. The density of connective tissue fibers, PAS activity and AB-PAS activity was higher in both groups of Vanaraja compared to Aseel.

Keywords: histology, histochemistry, Aseel, Vanaraja, ductus deferens

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Introduction

Aseel breed is domesticated mostly by tribal people for cock fighting which forms an integral heritage of southern part of Bastar district of Chhattisgarh and adjoining parts of Andhra Pradesh which are cores of breeding tract of this breed. Vanaraja crossbreed has been evolved at ICAR Project Directorate on Poultry, Hyderabad. Vanaraja is crossbreed of White Cornish and synthetic broiler breeds of poultry. This breed has an attractive feather pattern, better survivability, low cost of rearing and high disease tolerance. It produces 1.6 kg meat in 8 weeks and 55-65 eggs in 200 days. Vanaraja is being used by Department of Animal Husbandry (Chhattisgarh) under "Backyard Poulry Scheme" under central sponsored scheme "Low Input Technology of Birds of Coloured Strain". Aseel breed is well known for its pugnacity, high stamina, majestic gait and dogged fighting qualities. There is no literature available on ductus deferens of Aseel and Vanaraja breeds of poultry. Therefore, the present study was undertaken to investigate the histology and histochemistry of ductus deferens in relation to age of birds.

Materials and methods

The experiment was conducted on 40 apparently healthy male birds belonging to two different age groups of Aseel and Vanaraja poultry. Birds were procured from Government Poultry Farm, Jagdalpur and Durg (C.G.). Based on age, the birds were divided into two groups (grower and adult). Each group was having 20 birds (10 Aseel and 10 Vanaraja). Ductus deferens was collected in 10% buffered formalin, processed by Aclohol-Benzene method and sections were cut. The sections were stained with Haematoxylin and Eosin for normal histological structure, Van Gieson's for collagen fibers, Gomori's for reticular fibers, Verhoeff's for elastic fibers, PAS for carbohydrates and AB-PAS (pH - 2.5) for mucopolysaccharides. After recording different histological parameters of the ductus deferens, the data was analyzed statistically and interpreted (Snedecor and Cochran, 1967).

Results and discussion

The wall of ductus deferens consisted of an epithelial and fibromuscular layers. It confirmed the reports of Tingari (1971) and Hodges (1974). No histological difference could be observed between the right and left ductus deferens. In adults, the epithelium was pseudostratified columnar nonciliated in Vanaraja (fig. 2). It was in accordance to findings of Biswal and Das (1968), Tingari (1971), Hess *et al*. (1976), Lake (1981) and Lee and Ha (1983). Patches of simple columnar epithelium were also noticed, whereas in Aseel the epithelium of different types was recorded as from simple cuboidal to stratified cuboidal to simple columnar and pseudostratified columnar in middle region of ductus deferens (fig. 1). Holocrine secretory activity was noticed. It confirmed the observation of Lee and Ha (1983). In adults of Aseel, the nuclei of the epithelial cells had their long axis oriented vertically as well as horizontally. In growers, the epithelium was simple columnar to pseudostratified columnar in Aseel, whereas it varied from simple cuboidal to simple columnar to pseudostratified columnar in Vanaraja. The epithelium of the receptacle was similar to the remainder of the ductus deferens. It confirmed the finding of Tingari (1971).

The height of epithelium in cranial, middle and caudal parts of right and left ductus deferens of Aseel and Vanaraja were significantly higher in adults compared to growers. It was significantly higher in caudal than cranial and middle parts. The height of epithelium in cranial, middle and caudal parts of right and left ductus deferens was significantly lower in growers and adults of Aseel, when compared to Vanaraja. The highest average values of height of epithelium were recorded in caudal part of left ductus

deferens as 6.8 ± 0.34 µm in growers of Aseel and 7.6 ± 0.38 µm in growers of Vanaraja, respectively, 17.84 ± 0.89 µm in adults of Aseel and 21.2 ± 1.06 µm in adults of Vanaraja, respectively.

In growers, very low mucosal folds were noticed in Aseel. The medium to tall mucosal folds were present singly in Vanaraja. In adults, tall mural folds were noticed. One of them had secondary folds too. Several very low mucosal folds were also present. High mucosal folds and high epithelial folds were the characteristics in the caudal part of the ductus deferens.

The height and number of mucosal folds in cranial, middle and caudal parts of right and left ductus deferens of Aseel and Vanaraja were significantly higher in adults than growers. They were significantly higher in caudal than cranial and middle parts. The height and number of mucosal folds in cranial, middle and caudal parts of right and left ductus deferens were significantly lower in growers and adults of Aseel than Vanaraja (Table 1a, 1b). The highest average values of height and number of mucosal folds were recorded in caudal part of left ductus deferens as 17.44 ± 0.87 µm and 4 ± 0.21 in growers of Aseel and 34.2 ± 1.71 µm and 8 ± 0.42 in growers of Vanaraja, respectively, 70.64 ± 3.53 µm and 11 ± 0.57 in adults of Aseel and 74.12 ± 3.71 µm and 15 ± 0.79 in adults of Vanaraja, respectively.

Apart from epithelium, the rest of the wall was mainly made up of loosely arranged fibromuscular layer. It was comparatively looser in Aseel. The fiber orientation in the fibromuscular layer was oblique externally and circular internally. The wall of ductus deferens became thicker in caudal part of ductus deferens. The increase in thickness was caused mainly due to increase in the thickness of fibromuscular layer. However, the propria submucosa became more distinguishable at caudal part than in the cranial and middle parts.

The thickness of wall excluding mucosal folds in cranial, middle and caudal parts of right and left ductus deferens of Aseel and Vanaraja was significantly higher in adults than growers. It was significantly higher in caudal than cranial and middle parts. The thickness of wall excluding mucosal folds in cranial, middle and caudal parts of right and left ductus deferens was significantly lower in growers and adults of Aseel than Vanaraja. The highest average values of thickness of wall excluding mucosal folds were recorded in caudal part of left ductus deferens as 13.9 ± 0.7 µm in growers of Aseel and 21.6 ± 1.08 µm in growers of Vanaraja, respectively, 31.4 ± 1.57 µm in adults of Aseel and 55.1 ± 2.76 µm in adults of Vanaraja, respectively.

The maximum and minimum diameter in cranial, middle and caudal parts of right and left ductus deferens of Aseel and Vanaraja were significantly higher in adults than growers. They were significantly higher in caudal than cranial and middle parts. The maximum and minimum diameter in cranial, middle and caudal parts of right and left ductus deferens was significantly lower in growers and adults of Aseel than Vanaraja. Overall caudal part of ductus deferens was larger than cranial and middle parts mainly due to increased average diameter of ductus deferens. The highest average values of maximum and minimum diameter were recorded in caudal part of left ductus deferens as 431.68 ± 21.58 µm and 198.4 ± 9.92 µm in growers of Aseel and 522.68 ± 26.13 µm and 281.44 ± 14.07 µm in growers of Vanaraja, respectively, 790.68 ± 39.53 µm and 384.88 ± 19.24 µm in adults of Aseel and 878.56 ± 43.93 µm and 539.4 ± 26.97 µm in adults of Vanaraja, respectively. Tingari (1971) recorded the average luminal diameter of ductus deferens as 400 µm initially, 550 µm medially and 900 µm caudally. The data of adults of Vanaraja nearly matched the later finding.

The connective tissue fibers were noticed in propria submucosa and outer fibromuscular layer of ductus deferens, which confirmed the report of Gray (1937) and Hodges (1974). The fibers were lesser in density in Aseel as compared to Vanaraja. The density was

especially lesser in propria submucosa. These may be attributed to the lesser wall thickness in Aseel (fig. 2, 3).

The variable PAS reaction was noticed in the apical border of the epithelium ranging from weak, moderate to intense in adult birds. It confirmed the reports of Sarkar and Ghosh (1964-65), Lake (1957) and Tingari and Lake (1972). In growers weak to moderate reaction was noticed at same location. Less PAS activity was seen in Aseel as compared to Vanaraja (fig. 4). Less strong acid mucopolysaccharides were traced in the core of the mucosal folds and apical part of the epithelial cells. Acid mucopolysaccharide substances were absent in epithelium of growers of Aseel. Less AB - PAS activity was seen in Aseel as compared to Vanaraja.

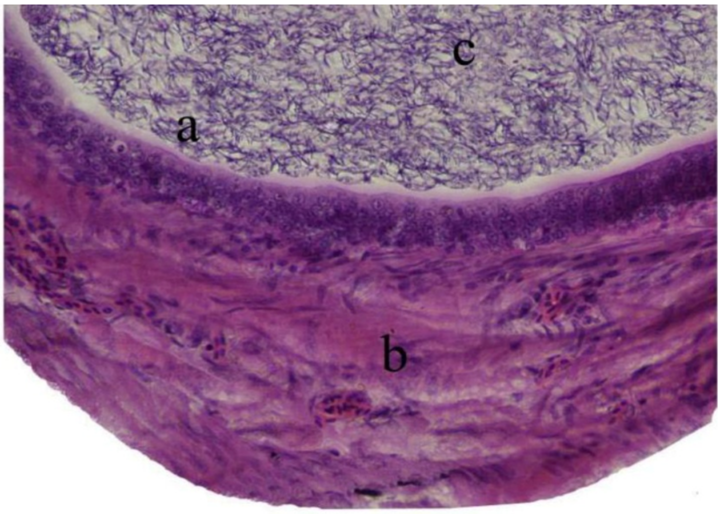


Figure 1. Photomicrograph of ductus deferens of Aseel (group 2) showing parsrecta a.epithelium, b. fibromuscular layer, c. spermatozoa (H&E, 400X)

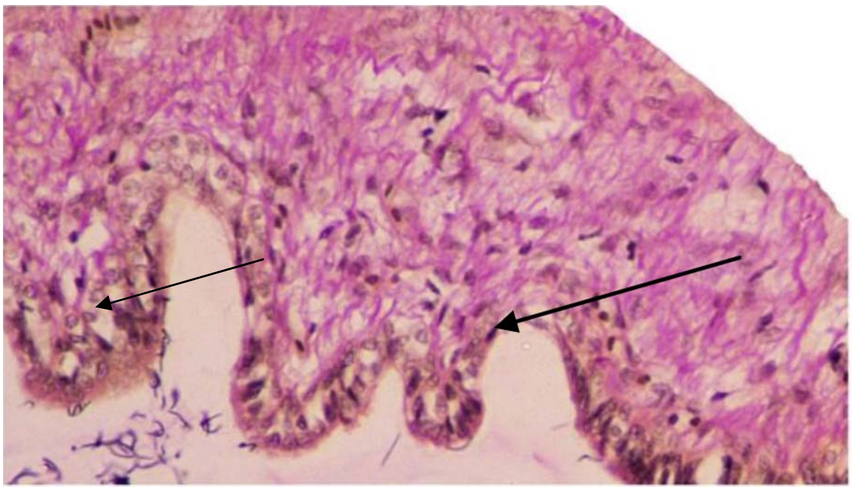


Figure 2. Photomicrograph of ductus deferens of Vanaraja (group 1) showing fibers (arrow) in the fibromuscular layer (Van Gieson's, 400X)

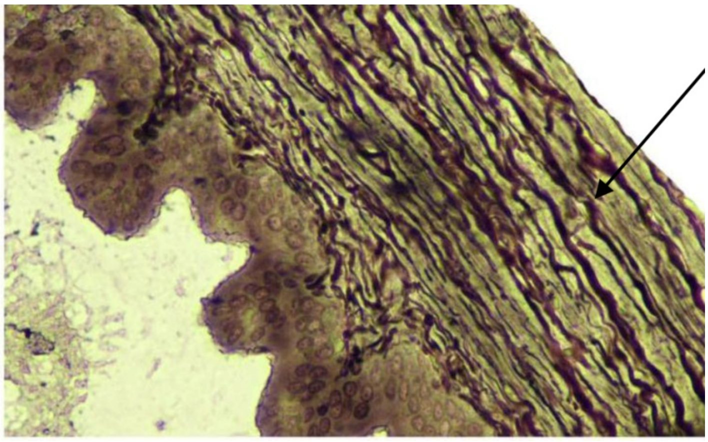


Figure 3. Photomicrograph of ductus deferens of Vanaraja (group 2) showing reticular fibers (arrow) in the fibromuscular layer (Gomori's, 400X)

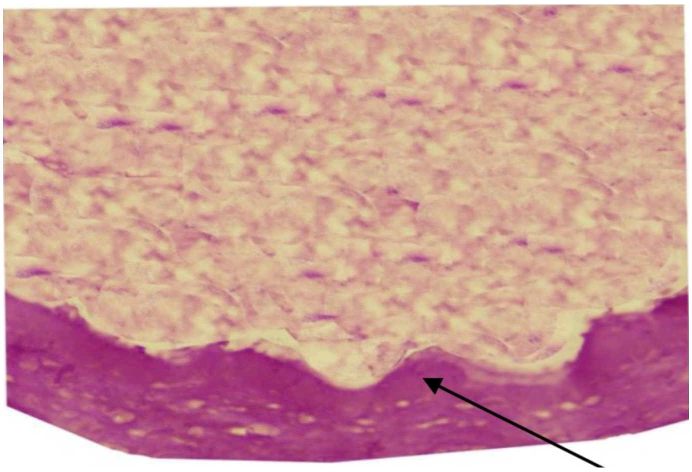


Figure 4. Photomicrograph of ductus deferens of Aseel(group 1) showing PAS activity (arrow) in epithelial lining and fibromuscular layer (PAS, 400X)

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مطالعه بافت شناسی و هیستوشیمیایی مجرای وابران در طیور نژادهای آسیل و واناراجا

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چکیده

آسیل نژادی بومی از طیور است که به دلیل نحوه قدم برداشتن با ابهت و استفاده در نزاع های خروس های این نژاد مورد توجه بوده است. محل اصلی پرورش این نژاد قسمت های جنوبی چاهاتیس گار است. واناراجا یک نژاد مخلوط است که بوسیله گروه دامپروری به منظور ارتقای وضعیت نگهداری آن در میان مردم بومی پرورش داده شده است. مجرای وابران بخشی از دستگاه تولید مثل است که نقش مهمی در انتقال اسپرم و باروری ایفا می کند. در مطالعه حاضر ده پرنده از دو گروه سنی مختلف شامل پرنده های ۵ ماهه (در حال رشد) و ۱۳ ماهه(بالغ) از هر یک از نژادها مورد استفاده قرار گرفت. سپس مجاری وابران آنها جمع آوری و بافت های آن آماده سازی شده و مقاطع بافتی به منظور بررسی ساختار بافت شناسی طیعی، فیبرهای کلاژن، فیبرهای الاستیک، فیبرهای رتیکولار، کربوهیدراتها و نیز موکوپلی ساکاریدها مورد رنگ آمیزی قرار گرفت. ارتفاع بافت پوششی، ارتفاع چین های مخاطی در بخش های مختلف، تعداد چین های مخاطی به ازای هر مقطع عرضی، ضخامت دیواره بدون در نظر گرفتن چین های مخاطی و نیز حداکثر و حداقل قطر مجرای وابران در پرندگان در حال رشد و نیز بالغین نژاد واناراجا بیشتر از نژاد آسیل بود. تراکم فیبرهای بافت همبندی و واکنش PAS و AB-PAS در هر دو گروه سنی نژاد واناراجا بیشتر از نژاد آسیل بود.

واژگان کلیدی: بافت شناسی، هیستوشیمی، آسیل، واناراجا، مجرای وابران